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# REPORT OF TWO CASES OF AMPUTATION AT THE HIP-JOINT, IN WHICH HEMORRHAGE WAS CONTROLLED BY TRANSFIXION-PINS AND ELASTIC COMPRESSION.

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# REPORT OF TWO CASES OF AMPUTATION AT THE HIP-JOINT, IN WHICH HEMORRHAGE WAS CONTROLLED BY TRANSFIXION-PINS AND ELASTIC COMPRESSION.[1]

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THE renewed interest which has been manifested in the subject of amputation at the hip-joint, on account of new methods that have been recently introduced, leads me to think that the report of the following two cases may be of sufficient interest to engage the attention of the Society:

CASE I. *Amputation at the hip-joint for recurrent sarcoma after previous amputation at the middle of the femur.*—H. B., twenty-two years of age, a German-American, entered the Cincinnati Hospital, June 28th. His father, one brother, and a sister had died of pulmonary tuberculosis, his mother, two brothers, and a sister being still alive. He has had a chancre and buboes, but no general manifestations of syphilis. He drinks beer freely. He has been employed on an ice-wagon, and has had to lift heavy masses of ice, resting them upon his knee. On admission there was a swelling, involving the entire circumference of the lower end of the femur, just above the condyles, with some distention of the joint. This

[1] Read before the Northwestern Ohio Medical Society, Toledo, December 15, 1893.

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swelling was elastic, without any marked points of softening, and was free from bruit or pulsation. Great pain was complained of. The history he gave was as follows:

Last winter he began to suffer with cramps in his left knee, and a swelling soon appeared on the outer side, with greatly increased pain. The swelling continued to grow, and involved the entire circumference of the leg. The pain became continuous and so severe that half-grain doses of morphin, given hypodermatically, were necessary to give him even temporary relief. His temperature on admission was 100°, his pulse 90. Soon after admission an exploratory incision was made over the outer aspect of the limb by Dr. Evans, then on duty in my absence, and the condition found seemed to indicate the presence of a ruptured aneurism. The incision was closed and healed promptly. On July 7th the cicatrix opened at one point, and some bleeding occurred. On the following day the man was anesthetized, and I made an incision into the tumor in the line of the recent cicatrix, after the circulation had been controlled by a rubber tourniquet at the upper part of the thigh. The knife at once entered a large cavity, from which, under strong pressure, over a pint of fluid blood escaped. An incision four or five inches long, was now made on the inner side of the leg, and for some inches the femur was found bare and roughened round four-fifths of its circumference. This condition extended down to the intercondyloid notch. At the lower part new soft bone had formed from the periosteum. No tissue resembling tumor-growth was found, and there were no layers of fibrin such as are usual in aneurism. The incision on the inner side of the thigh enabled us to explore the main vessels, and they were found intact. From the condition here found I considered that we had to deal with a periostitis, but as the bone was so extensively affected, I judged that amputation was the wiser course; and this was performed without removing the tourniquet. An examination of

the part removed left it uncertain whether the disease was an inflammatory affection or sarcomatous. A subsequent microscopic examination by Dr. Evans proved the correctness of his view, expressed at the time, of the sarcomatous character of the trouble. The wound healed promptly, and the man immediately began to gain in flesh, and in a few weeks left the house, free from pain, and some pounds heavier than when he entered.

On October 6th, just three months after the operation, the man again came into the hospital. For several weeks he had suffered pain in the stump, which had been also growing larger. The skin over the end of the stump was reddened and distended, as from an underlying growth; there was no fluctuation, and the cicatrix was perfect. Great pain was complained of.

On October 8th, the man was anesthetized, the stump laid widely open, when a condition similar to that found in the first operation was discovered. The swelling was composed principally of fluid blood; there was, however, unmistakable evidence of sarcomatous growth about the end of the bone, and amputation at the hip-joint was, therefore, determined upon. It is to the method adopted that I desire especially to call your attention, as it differs in some details from the proceeding of other operators; combining the operation of F. Jordan with elastic compression of vessels in both anterior and posterior segments of the limb by means of transfixion-skewers and elastic tubing applied as a figure-of-eight over each half. Thorough disinfection of the entire limb, groin, and buttocks had previously been carried out in anticipation of disarticulation being necessary. The knife was made to enter midway between the crest of the ilium and the top of the trochanter, and, by a slightly curved incision, was carried over the outer aspect of the latter, and then down on the outer side of the femur to the face of the stump. This incision exposed the capsule of the joint, and the knife was carried down to the bone along the

entire course of the incision. One or two small vessels spouted, and were at once secured by forceps. A long steel pin, prepared for the purpose, was at once thrust through the upper part of the wound, just in front of the neck of the femur, and made to come out on the inner side above the lesser trochanter. An elastic tube was then wound in a figure-of-eight over the anterior aspect of the limb, so as to include the ends of the pin, and thus securely occlude all of the vessels in the segment. The head of the femur was then rapidly disarticulated by cutting through the capsule, and freeing the muscles attached to the great trochanter. A second pin was now passed, coming out near the first, and the posterior segment was constricted in a manner similar to the first. The soft parts, from the stump upward, were now quickly peeled off the bone, which was thus easily enucleated. Before amputating the remaining mass of muscles, a third pin was thrust through the tissues from before backward just below the first two in place. This third pin was unnecessary and useless, and somewhat in the way. A circular incision was now made through the skin, the femoral vessels isolated and secured, and the muscular mass cut through at a higher level. Absolutely no blood was lost. At points the muscles and intermuscular tissue presented a suspicious appearance, and these were carefully cut away with scissors. All visible vessels were secured and the pins then withdrawn. The loss of blood was practically none, and the operation was attended with little shock. The wound was closed throughout with the exception of a large-sized drainage-tube, which was carried into the acetabulum.

The progress of the case was satisfactory so far as the closure of the wound was concerned, but recently there have developed some symptoms that probably indicate recurrence of the trouble.

The method adopted in this case was suggested by the operation recently described by Senn, and is based

on the same principle, namely, the control of hemorrhage by the independent constriction of the anterior and posterior segments of the limb above the point of amputation. Senn uses for this purpose simple pieces of tubing, without any skewer. After exposing the hip-joint by an incision similar to that of Langenbeck for excision, he disarticulates and then pushes a long pair of forceps through the tissue in front of the bone until it reaches the skin on the inner side of the thigh. The skin is incised and the forceps pushed through, and a strong piece of tubing, several feet long, is then grasped at its middle and drawn back and cut in two. The anterior segment of the limb is then constricted by tightly drawing the end of one piece across the face of the thigh, and tying or catching it by strong forceps. The posterior segment is then treated in a similar way. The entire circulation of the thigh is thus controlled by the two pieces of tubing. In a large muscular limb it would seem as though it might be difficult to secure sufficient compression of the vessels in this way, as the elasticity of a single thickness of the tubing is only available as a constricting force. The transfixion-pins, with the elastic tubing wound a number of times in a figure-of-eight over the limb must certainly secure firmer and more certain pressure, and the pins will be an additional security against slipping; and, moreover, they can be applied at a higher point, and by making the incision before the transfixion, they do not in any way interfere with the subsequent steps of the operation.

At the time of my operation I did not know that the plan I employed had been used before, but I find the account of an operation by Ogilvie Will,[1] in which the steps were identical, except that he had a single pin and applied constriction only to the anterior segment, as his flaps were cut somewhat differently. "The mode of

[1] British Medical Journal, November 16, 1889.

operation I adopted," he says, "was that of F. Jordan, the skewer being passed from without inward between the bone and the soft parts in front of it through the upper end of the vertical incision, with which Mr. F. Jordan's operation commences." "The use of the skewer in hip-joint amputation originated with Spence, of Edinburgh." "The combination of Jordan's procedure with Professor Spence's skewers," he continues, "is most admirable, and really leaves nothing to be desired, for it is simple, easy, bloodless, and well adapted for drainage, while the presence of an unbroken skin on the inner side of the thigh is a matter of no inconsiderable moment."

In Wyeth's method the closure of the vessels is secured by winding an elastic tube around the entire circumference of the limb, security against slipping being secured by two pins that pass the one within and the other without the bone. The encircling tube would seem to offer an embarrassment to disarticulation, if it did not prevent it entirely before removal. If I can judge from Wyeth's recent description of his operation, he effects disarticulation before removal of the tube, though he says it may be removed if necessary. In the *British Medical Journal*, January 4, 1890, R. J. Garden describes an amputation at the hip-joint in which he transfixed the limb from before backward, the skewer passing between the bone and the femoral vessels, the constriction of these vessels being secured by a rubber tubing carried over the skewer and the inner segment of the limb. A long inner flap was then formed by transfixion, cutting from within outward. There is no reason why this same plan could not be carried out after exposing the hip-joint by the anterior incision for excision, and subsequent introduction of the skewer after the capsule had been exposed and the joint examined. Indeed, this plan might possess great advantages in cases of tuberculous disease, when thorough examina-

tion of the joint was desirable before deciding on the necessity for amputation, or in cases of sarcomatous disease situated upon the outer and upper part of the femur. The preliminary exposure of the joint and upper part of the femur in the manner described facilitates the introduction of the skewer, which is then entirely out of the way of the manipulations necessary for disarticulation. One caution in using the skewer is necessary, namely, to see that it is strong enough not to bend under the traction of the elastic tubing.

I have recently performed a second amputation at the hip-joint by essentially the same method as that already described.

CASE II. The patient was a mulatto, twenty-two years of age, who some ten years ago had suffered an amputation at the middle of the leg for tuberculous disease of the ankle. Some months ago a new tuberculous process developed above and within the anterior superior spinous process of the ilium, which led within the pelvis. This had been several times scraped out. On November 27th his temperature rose to 102.5°, and continued high for some days, when an abscess burst on the inner side of the thigh and discharged a large quantity of tuberculous pus. No improvement followed this discharge, but the fever and septic symptoms continued. On December 6, he was anesthetized and carefully examined, full consent having been obtained for the performance of any operation deemed expedient. Close to the perineum on the inner aspect of the left thigh a large opening was found, where the abscess had spontaneously burst. The finger, introduced, passed up into the pelvis on the inner aspect of the tuberosity of the ischium, the depth of the cavity being so great that it could not be fully explored. The anterior opening, near the anterior spine, was traced downward, and bare rough bone found on the inner aspect of the ilium. A sinus from this opening passed down to the imme-

diate vicinity of the anterior part of the neck of the femur, but no connection with the joint could be found. The joint was exposed by the usual vertical incision on the outer aspect, reaching down well below the trochanter. This incision opened a large abscess outside of the joint, which did not seem directly involved. A rapid consultation determined that the removal of the limb gave the only possible chance in the presence of such extensive disease. A single pin was at hand, and this was passed anterior to the bone and brought out on the inner side of the thigh. The only tubing available was so light that the flat rubber Esmarch tourniquet was used for the purpose of the figure-of-eight constriction, and the traction was so strong that the pin bent considerably. On this account, as an extra precaution, an Esmarch bandage was wrapped a number of times around the limb below, and a circular incision was then made through all the soft parts, down to the bone. This was left intact in order to gain the advantage of leverage in the manipulation necessary for the disarticulation. The femoral vessels were now secured in the wound, and the Esmarch bandage removed. This latter bandage I am satisfied was superfluous, and I am confident that the light tubing would alone have given perfect occlusion of the vessels. The soft parts were readily separated from the femur from below upward, and disarticulation readily affected. A number of tuberculous foci were scraped or dissected out, the various sinuses packed with iodoform-gauze, and the wound closed. After several days the temperature fell to normal and the man showed marked improvement in every way. The results so far have been entirely satisfactory.

I have long been satisfied that amputation at the hip-joint should play a more frequent rôle in the operative treatment of tuberculous disease of the hip-joint than it does.

In this case the joint-cavity itself was not involved, but there was a carious condition of the neck of the femur that might soon have reached the cavity itself, and repair in the man's condition would have been impossible.

To enumerate the steps in the operation here described, we have:

1. The capsule of the joint is exposed by an incision on the outer aspect of the limb, similar to the one used for an excision.

2. A skewer is then passed through the upper part of this incision, in front of the bone, and made to present on the inner aspect of the limb. A piece of elastic tubing is now wound in a figure-of-eight manner over the surface of the limb and ends of the pin, securely compressing all the vessels in the anterior segment of the limb.

3. The head of the femur is now disarticulated by incising the capsule and cutting through the muscles inserted into the great trochanter.

4. A second skewer is passed through the limb, coming out at a point on the inner side near the first, and constriction of the posterior segment secured in the same manner as that of the anterior segment.

5. A circular incision of the skin is now made at the point selected, the muscles are cut through at as high a level as possible, and the vessels secured.

6. The femur is enucleated and the skewers removed.

7. Closure of the wound is then effected, with such drainage as the case requires.

If for any reason it is desired to secure a long anterior flap, or if for any reason it is deemed advisable to approach the joint from the front, the incision may commence "below and within the anterior spine and run down between the tensor vaginæ and glutei externally and the sartorius internally, and expose the joint," as advocated by Marsh, and the skewer can then be

inserted from before backward, between the femoral vessels and the bone, in the manner described by Miles.[1] The inner segment of the limb is then constricted by elastic tubing applied in a figure-of-eight manner. Amputation may be accomplished by transfixion or by cutting the flap from without inward, or by the circular method, if desired. Such a plan might at times be more desirable than the method by the incision on the outer side.

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[1] British Medical Journal, November, 1889.

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